Designing Energy Efficient Automotive Testing Laboratories

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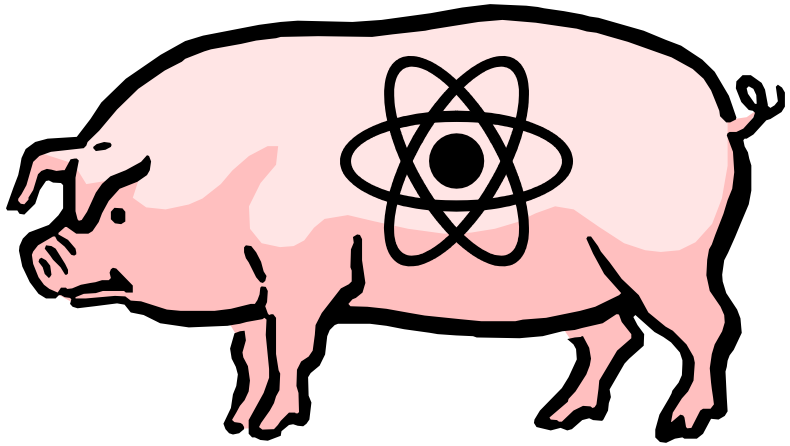
Key Discussion Points

- **Automotive Testing Labs**
- **Strategies for Energy Efficiency**
  - Technology
  - Flexibility
  - Sustainability
  - Life Safety
- **Wrap Up**

Automotive Testing Labs

- **Service to the Transportation Industry**
- **Perception: Capability Comes at the Expense of Energy**
- **Truth: Testing Does Utilize Significant Energy that is Difficult to Compromise, but…**



Technology

Air System Efficiency

- Variable Volume
- Apply Diversity of Utilization
- Design for Part Load Operation
- Occupancy Based Ventilation (lighting)
- Snorkels in Lieu of Canopies
- Consider Energy Recovery

Technology

Water System Efficiency

- Variable Volume
- Avoid One-Pass Domestic Water Systems
- Utilize Natural Water Sources
- Set Back Water Temperatures

Technology

Dedicated vs. Central Systems

Dedicated

- Excessive Equipment Requirements
- Infrequent Lab Use
- Space for Third Party Use

Central

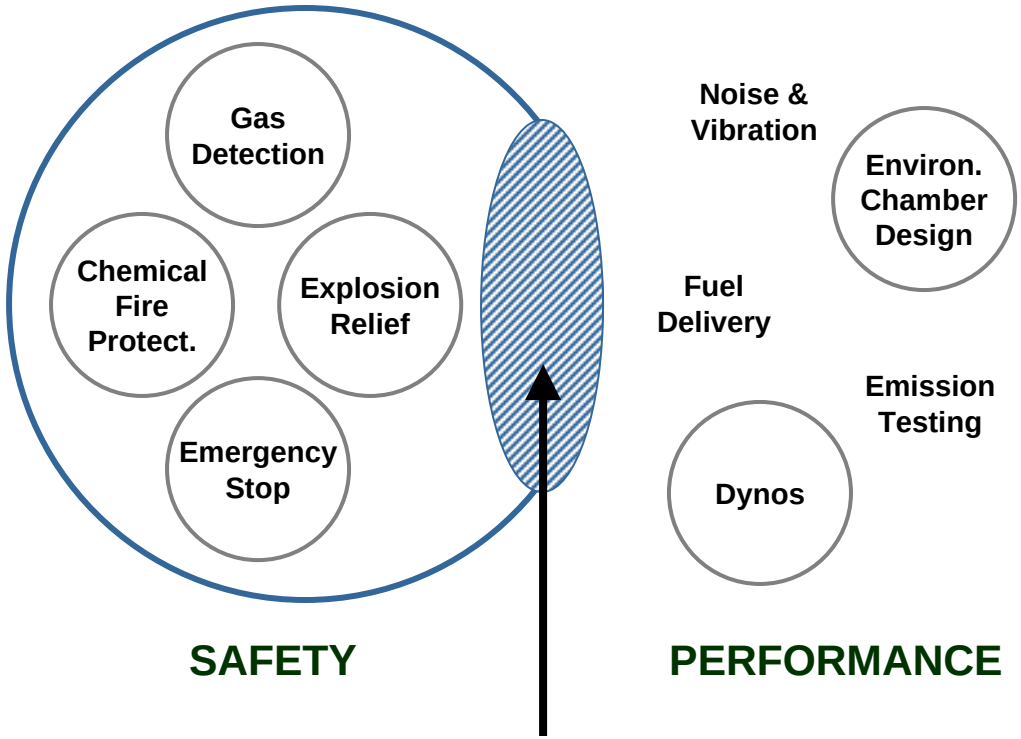
- Large Labs with Diversity
- Limited Equipment Area
- Future

Technology

Microprocessor Based BMS and Systems Integration

- **Precise Control (Environmental Chambers)**
- **Unique Operating Requirements**
- **Many Systems – Synchronous Operation**
- **Comprehensive Life Safety Systems**

Technology



Systems Integration

Technology

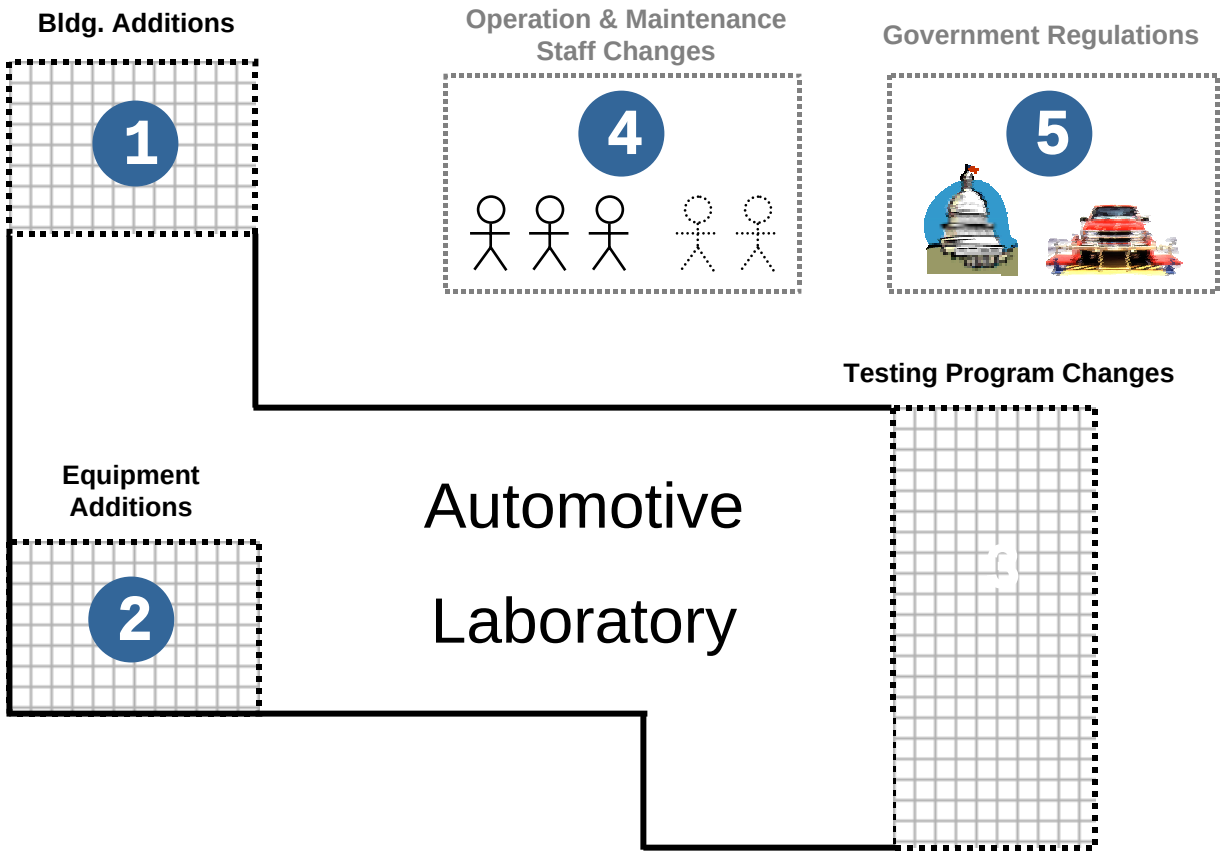
Building Material Efficiency

- High Performance Insulation
- High Efficiency Glazing
- Increase Natural Light
- Operable Windows in Support Areas

Flexibility

- **Schedule Testing to Facilitate Sharing**
  - Reduce quantity of systems required
  - More consistent system run time
- **Modular Design**
  - Easier operation and maintenance
  - Easier modification
  - Efficiency of ownership over life of building
- **Central Systems**
  - Eliminate need for new systems
  - Take advantage of system diversity
  - Life cycle perspective

Flexibility

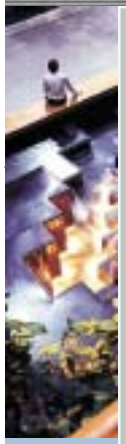


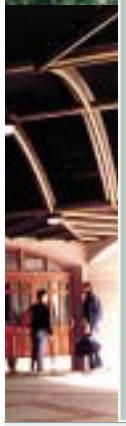
Sustainability

- **Energy Conservation is a Subset**
- **Focus on Societal Benefits**
  - Materials provided at lower cost
  - Materials supplied at lower cost (local)
  - Recycled products
  - Conserve natural resources to benefit everyone
- **LEED & EPC**
- **Higher First Cost But… Significant Energy Savings**

Life Safety

- **Most Important Issue in any Building**
- **Research Teams "Push the Envelope"**
- **Visitors Are Unaware of Hazards**
- **Key Systems:**
  - Fire suppression
  - Gas detection
  - Fuel leak detection and control
  - Hazardous material storage
  - Volatile exhaust





Life Safety

This is not typically an energy efficiency issue, but it is cost effective, especially when you consider the cost of an on-site injury or fatality.

Wrap Up

- **Auto Testing Labs Serve a Distinct Purpose**
- **Testing Requires Significant Energy Resources**
- **Testing Program is Not Easily Compromised**
- **There Are Opportunities for Energy Savings**
- **Look for Design Partners with Experience and a Culture Encouraging Innovation**

Technology

- **High Efficiency Building Materials**
  - High performance insulation
  - High efficiency glazing
  - Increase natural light and reduce HVAC load
- **Occupancy Based Lighting and Ventilation**
  - Support areas, including staff offices
  - Conference, training and other assembly spaces

Technology

- **Dedicated Systems**
  - Infrequently used lab spaces
  - Spaces reserved for 3rd parties
- **Central Systems**
  - Large labs with usage diversity
  - Limited equipment area

Technology

- **Variable Volume Systems**
  - Diversity opportunities
  - Part load is the primary operating condition
- **Microprocessor Based BMS**
  - Precise control (environmental chambers)
  - Unique operating requirements

Technology

- **Systems Integration**
  - Many systems, synchronous operation
  - Comprehensive life safety systems

Sustainability

- **U.S. Green Building Council and LEED**
  - Sustainability guidelines
  - LEED for labs
  - LEED certification usually increases cost, but…
  - Significant energy savings